A Modular Minimum Cost Launch System for Nano-Satellites

Whittinghill Aerospace, LLC

Technical Abstract
As minimum cost will be required for a dedicated Nano-Sat Launch Vehicle, a parallel staged, highly modular vehicle architecture is proposed for development. The principal advantage of a modular architecture for this size of vehicle is the single propulsion development for the boost stages at a relatively small scale. This approach drastically shortens development timelines and cost. A candidate launch vehicle with a cluster of seven identical modules would light 4 modules for the first stage, 2 for the second, 1 for the third, and fire 1 small spinning Apogee Kick Motor (AKM) for the fourth. Whittinghill Aerospace (WASP) proposes to refine the Phase 1 design of an all-composite, N2O-fed Hybrid Rocket Motor (HRM) propelled, 25 kg to LEO launcher. WASP will then build and fire the AKM, build and fire the core module HRM, then launch the full-scale core module as an unguided sounding rocket from a commercial range. At the conclusion of Phase 2, the technology will be at a TRL level of 6.

Company Contact
George Whittinghill
(805) 805-2297
grw@whittinghillaerospace.com

2008 Phase II
Proposal S4.01-8692

NanoSat Launch Vehicle Technologies

ESPA Based Secondary Payload Orbit Maneuvering System

Busek Co., Inc.

Technical Abstract
Busek proposes to develop an integrated propulsion, power, ACS, (ProPACS) system for micro-spacecraft deployed from the ESPA ring secondary payload ports. The standardized ProPACS system integrates the essential elements needed for highly capable micro-spacecraft bus including; 1) 600 W Hall effect thruster system for primary propulsion, 2) Xe cold gas thrusters for propulsive ACS, 3) articulated solar array, batteries and power management and distribution (PMAD) system with steady state power of 700W available to the payload when propulsion is off and 4) an integral structure that supports the payload and a LightBand separation mechanism for the ESPA ring. The ProPACS can provide over 1,800 m/sec deltaV to a 181 kg spacecraft with a 80kg payload. In Phase 1 ProPACS system architecture design was completed and all major components were identified. Mass, power, data budgets were developed and major interfaces were specified. Phase 2 focus will be on the ProPACS elements with lower TRL to achieve system wide TRL6 at the end of the program. The thruster will be advanced to near flight level, two PMAD systems will be evaluated and one selected and the ProPACS integral structure supporting the payload and separation ring will be designed and built.

Company Contact
James Szabo
(508) 655-5565
jszabo@busek.com

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